Bell Work
8-Sept-2017

For example if you weigh out gold jewelry to sell for extra cash and the scale being used reads to the decigram (XXX.Xg) and you record 28.4g at a price of $43.3/ gram, how much money should you get?

What if the actual weight was 28.44g, were you shorted?

Objective

You will be able to round number based on significant figure rules.

Significant figures

There are 2 kinds of numbers:

Exact: the amount of money in your account. Known with certainty. Anything *COUNTED*

Approximate: weight, height—anything **Measured**. No measurement is perfect.

Recall

A. Exact numbers are obtained by
    1. using a measuring tool
    2. counting
    3. definition

B. Measured numbers are obtained by
    1. using a measuring tool
    2. counting
    3. definition

Practice

Classify each of the following as an exact or a measured number.

1 yard = 3 feet

The diameter of a red blood cell is 6×10^{-4} cm.

There are 6 hats on the shelf.

Gold melts at 1064°C.

When to use Sig Figs

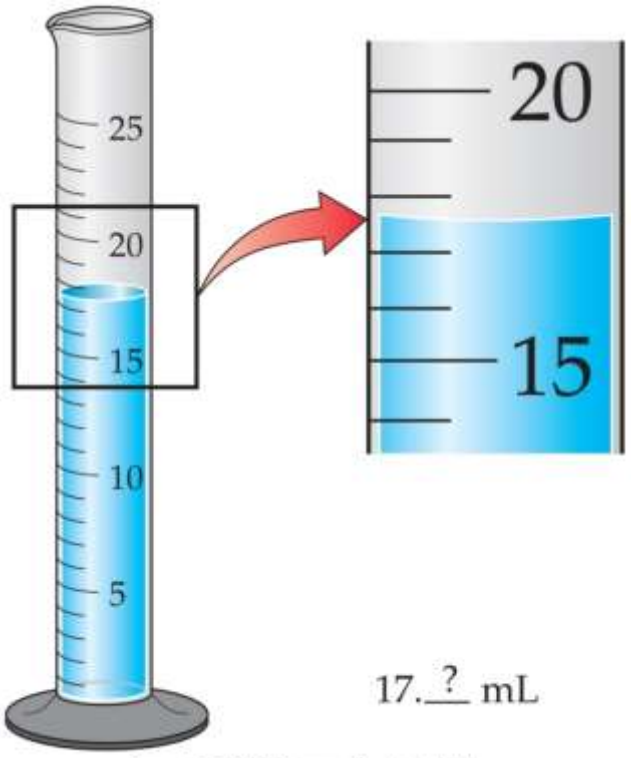
When a measurement is recorded only those digits that are **dependable** are written down.

Every experimental measurement has a degree of uncertainty.

The volume, V, at right is certain in the 10's place, 10mL<V<20mL

The 1's digit is also certain, 17mL<V<18mL

A best guess is needed for the tenths place.



Another Example

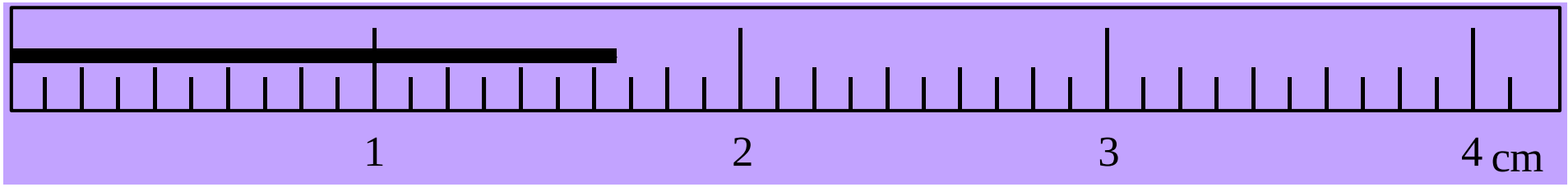
We can see the markings between 1.6-1.7cm

We can't see the markings between the 0.6-0.7

We must guess between 0.6 & 0.7

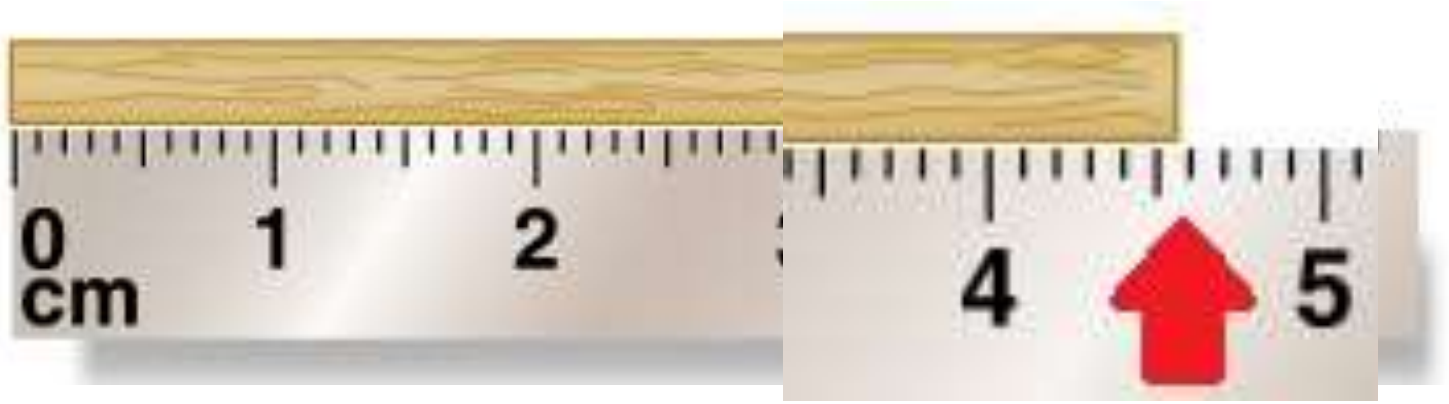
We record 1.67 cm as our measurement

The last digit an 7 was our guess...stop there



Your Turn

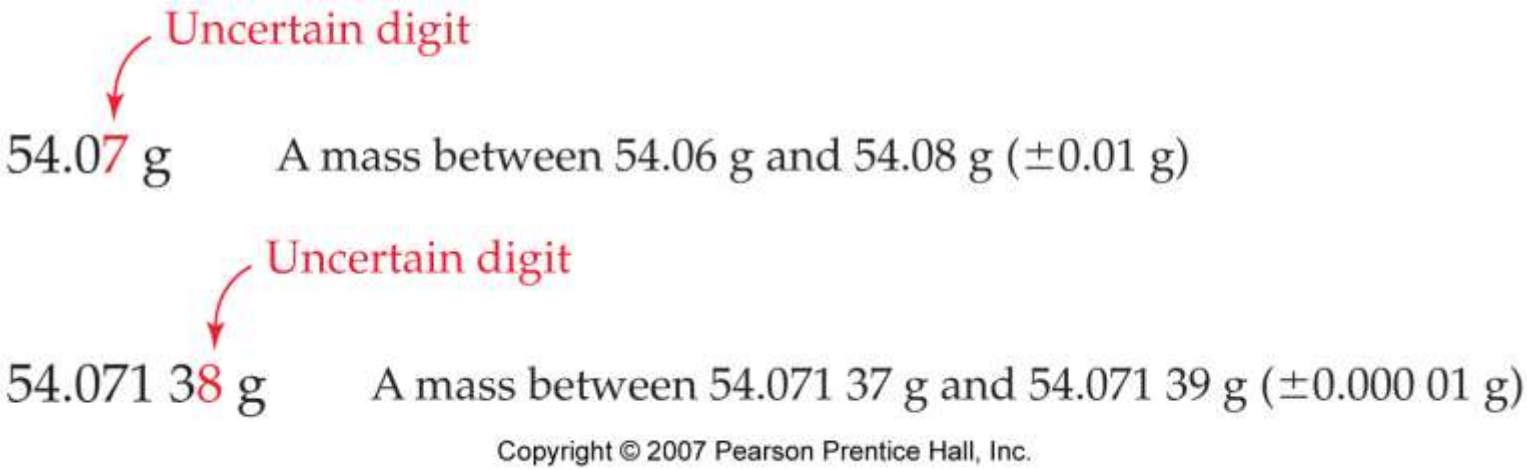
Measured Numbers have error…you have to make that Guess!



What is the length of the wooden stick?

1) 4.5 cm
2) 4.54 cm
3) 4.547 cm

Recorded Numbers



All but one of the significant figures are known with certainty. The last sig. fig. is only to the best possible estimate.

To indicate the precision of a measurement, the value recorded should use all the digits known with certainty.

The Rules

RULE 1. Zeros in the middle of a number are like any other digit; they are always significant.

Ex. 45.081 g has five significant figures.

RULE 2. Zeros at the beginning of a number are *not* significant; they act only to locate the decimal point.

Ex. 0.0537 cm has three significant figures, and 0.069 01 mL has? **4**

The Rules cont.

RULE 3. Zeros at the end of a number and *after* the decimal point are significant. It is assumed that these zeros would not be shown unless they were significant.

Ex. 527.700 m has six significant figures.

If the value were known to only four significant figures, we would write 527.7 m.

The Rules cont.

RULE 4. Zeros at the end of a number and *before* an implied decimal point may or may not be significant. We cannot tell whether they are part of the measurement or whether they act only to locate the unwritten but implied decimal point.

Ex. 280 000km has 2 sig. figs.

How Many Sig Figs?

a. 45.8736

b. 0.000239

c. 0.00023900

d. 48000.

e. 48000

f. 3.982×10^6

g. 1.00040

Scientific Notation

When ever you are unsure – convert to scientific notation

$$215. = 2.15 \times 10^2$$

Decimal point is moved two places to the left, so exponent is 2.

$$3.7962 \times 10^4 = 37{,}962$$

Positive exponent of 4, so decimal point is moved to the right four places.

$$1.56 \times 10^{-8} = 0.000\,000\,015\,6$$

Negative exponent of –8, so decimal point is moved to the left eight places.

Practice

1. Indicate how many significant figures there are in each of the following measured values.

246.32	5 sig figs	1.008	4 sig figs	700000	1 sig fig
107.854	6 sig figs	0.00340	3 sig figs	350.670	6 sig figs
100.3	4 sig figs	14.600	5 sig figs	1.0000	5 sig figs
0.678	3 sig figs	0.0001	1 sig fig	320001	6 sig figs

2. Calculate the answers to the appropriate number of significant figures.

32.567	246.24	658.0
135.0	238.278	23.5478
+ 1.4567	+ 98.3	+ 1345.29
169.0	**582.8**	**2026.8**

3. Calculate the answers to the appropriate number of significant figures.

a) 23.7 x 3.8	= **90.**	e) 43.678 x 64.1	= **2.80×10^3**
b) 45.76 x 0.25	= **11**	f) 1.678 / 0.42	= **4.0**
c) 81.04 g x0.010	= **0.81**	g) 28.367 / 3.74	= **7.58**
d) 6.47 x 64.5	= **417**	h) 4278 / 1.006	= **4252**

Adding and Subtracting

Rule: When adding or subtracting measured numbers, the answer can have no more places after the decimal than the **Least** of the measured numbers.

Practice

5.45cm + 2.3cm = 7.75cm,
Round off to = 7.8cm

You try:
7.432cm + 2cm =
9.432 round to → 9cm

Multiplications and Division

Rule: When multiplying or dividing, the result can have no more significant figures than the **least** reliable measurement.

Practice

56.78 cm x 2.45cm = 139.111 cm^2

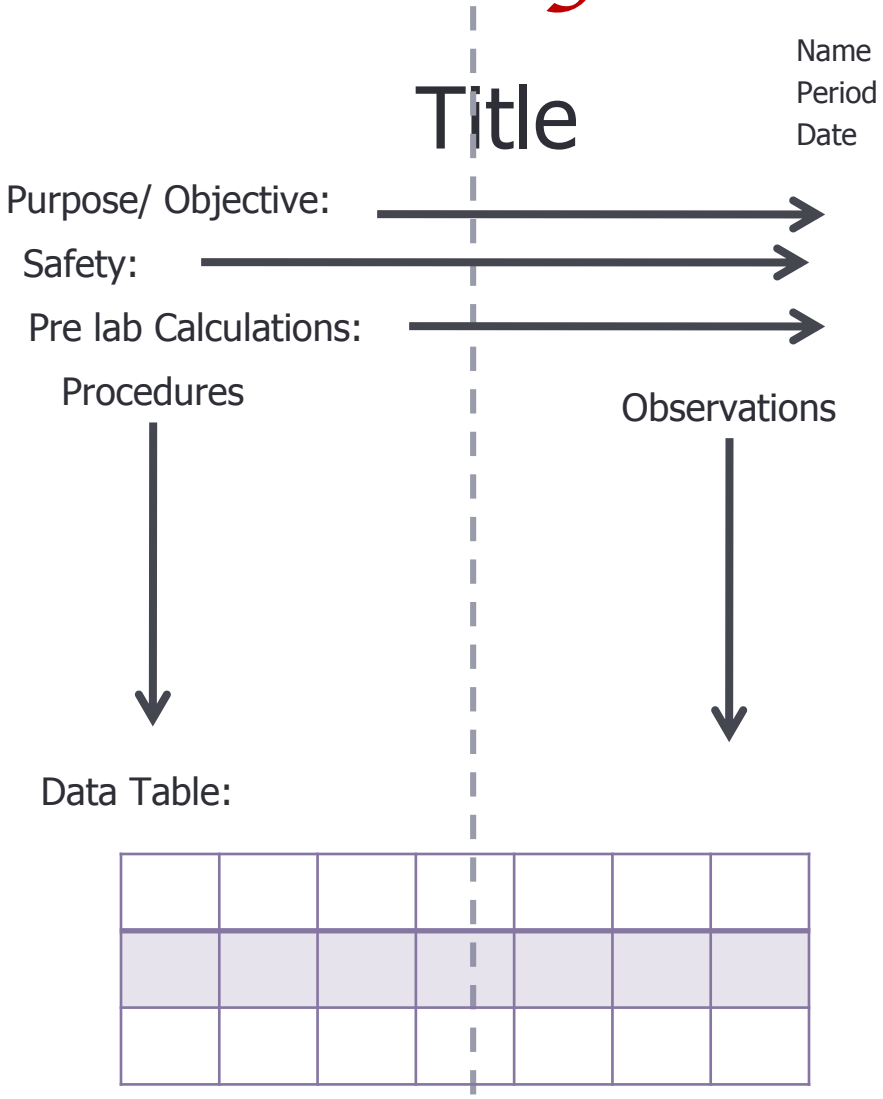
Round to → 139cm^2

75.8cm x 9.6cm = ?

Home Work 8Sept17: Pre Lab Density

Use as many piece of paper as you need, try not to write on both side.

Analysis and conclusions should be recorded at the end of the pre lab after the lab



Bell Work
11-Sept-2017 Pre - AP

Why was failing your last test in here a good thing, what are the positives of failure.

If you earned an "A" what did you do in preparation to secure that grade.

EQ: Why is knowing how to fail as important if not more important than succeeding?

Objective

You will be able to determine the density of a metal after finding its mass and volume.

You will learn a fast method for finding volume.

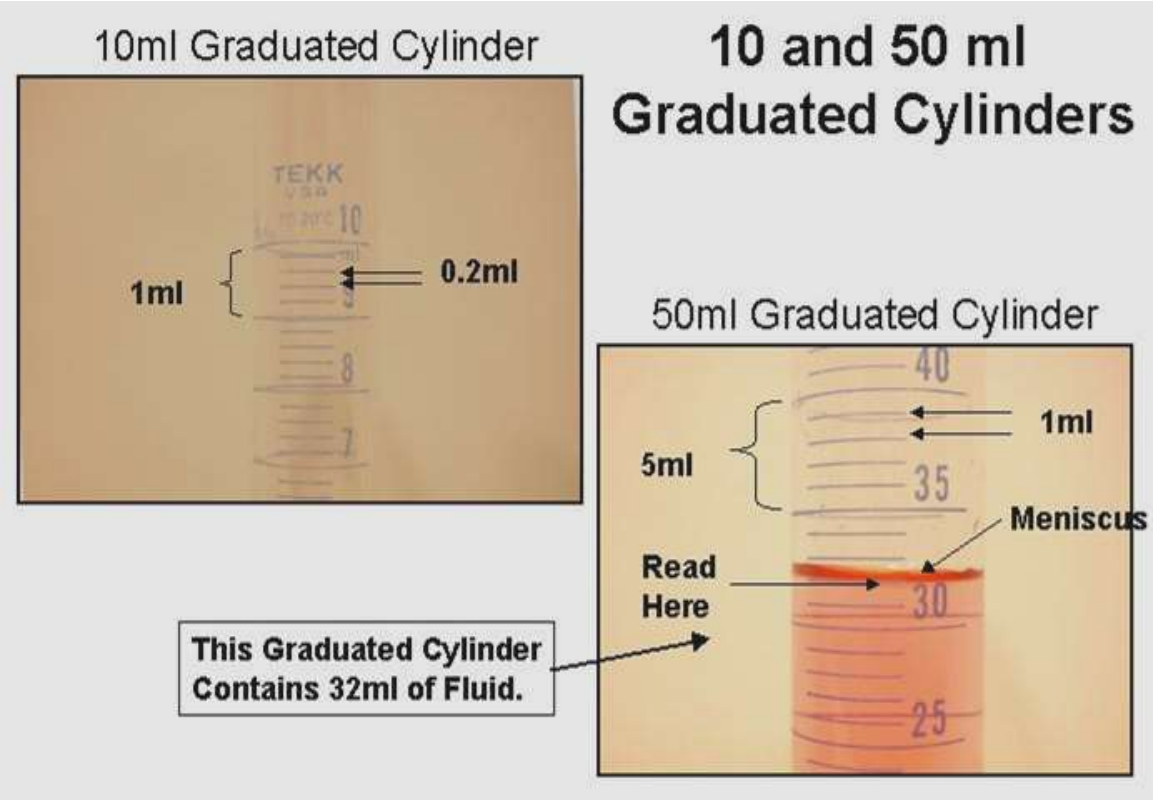
Volume

How do you get the volume of a brick?

What about a rock?

Reading a Graduated Cylinder

What do you think is the volume of the solution in your graduated cylinder?



Density Lab

There are eight (8) different metals, A-H, you will work each and rotate through the lab

Each metal type needs a minimum of three (3) different samplings of volume and mass.

Dry metals before weighing, all sphere metals use weigh boats

Density Lab

Safety: **Do Not** touch the lead, Pb, with your fingers or hand. No Toces El Plomo

When using the Pb / "G" use 15 balls at a time.

So 15, 30, 45, ____ etc. when measuring

Follow directions!

When finished, record data on board for class to copy down for graphs.

Actual Density Values for percent Error

1. Person from each group:

Please come up to board and enter any *one* of your values you measured for each sample

2. Take a picture or look up data on class website in power point section

Average Vol. & Mass Period 1

Period 1

Mass and Volume data
Density Pre AP Chemistry

Sample	A1		A2		B		C	
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)
1								
2								
3								
4								
5								
Sample	D1		D2		E1		E2	
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)
1								
2								
3								
4								
5								
Sample	F		G1		G2			
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)		
1								
2								
3								
4								
5								

Before you leave…

What laboratory tool could you use to find the volume of a metal nut?

How would you carry out the measurement?

What should you be sure to do to insure the volume is measured correctly?

When finished record data on board for class to copy down for graphs.
Email graph to: william.golden@fwusd.org
Subject: P.X.LastName.FirstName.Density

Recap

What did we do in the lab Friday day?

What two (2) measurements did we make?

Intensive property: Independent of the quantity or amount (Melting point, density, Molar Mass, etc.)

Extensive property: Depends on the amount. (Mass, volume, temperature, measurements)

Bell work, 13-Sept-2017

A. Add you "Density Lab" data to the computer at front or rear of lecture area

B. Log on to a computer in your seat ~~the lab and~~ go to the class website.

- Excel 2007 or 2016 find under start menu, programs, look for Microsoft office 2016 folder or the Excel 2007 program
- Class Web Site, Lab page and power Point page

B. Once there get out your Density Lab handout, data, and Density Practice Problems – check your work with your neighbors.

EQ: Why is knowing how to fail as important if not more important than succeeding?

Agenda:

Use data from density lab to develop a series of line graphs on excel which show density as slope

Opened on your computer

- Excel 2007 or 2016 find under start menu, programs, look for Microsoft office 2016 folder or the Excel 2007 program

- Class Web Site, Lab page and power Point page

Actual Density Values for percent Error 2017

$A_{1\&2}$: 0.75g/cm^3

B: Al 2.7g/cm^3

C: SiO_2 g/cm^3

D_1 :Cu 8.96g/cm^3

D_2 :Cu 7.18g/cm^3

D_3 :Cu 8.83g/cm^3

$E_{1\&2}$: Steel 8.05 g/cm^3

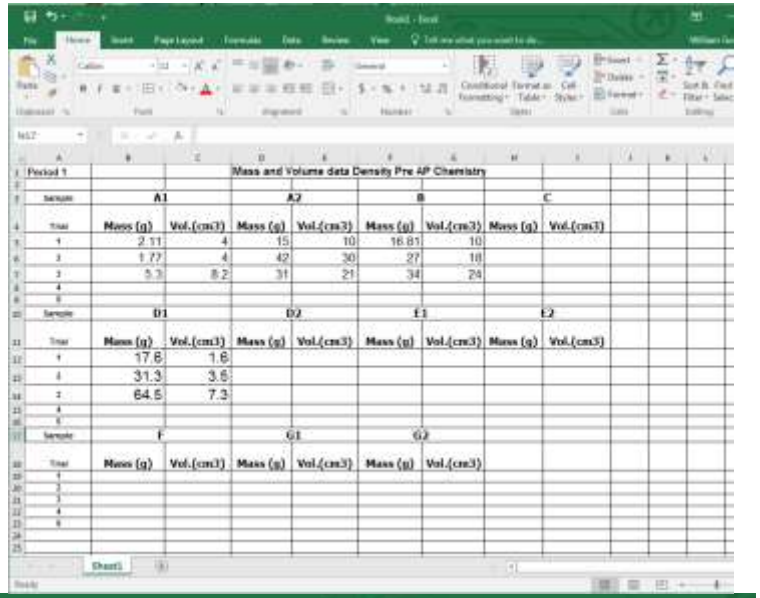
F: FeS_2 5.02g/cm^3

$G_{1\&2}$: Pb 11.34g/cm^3

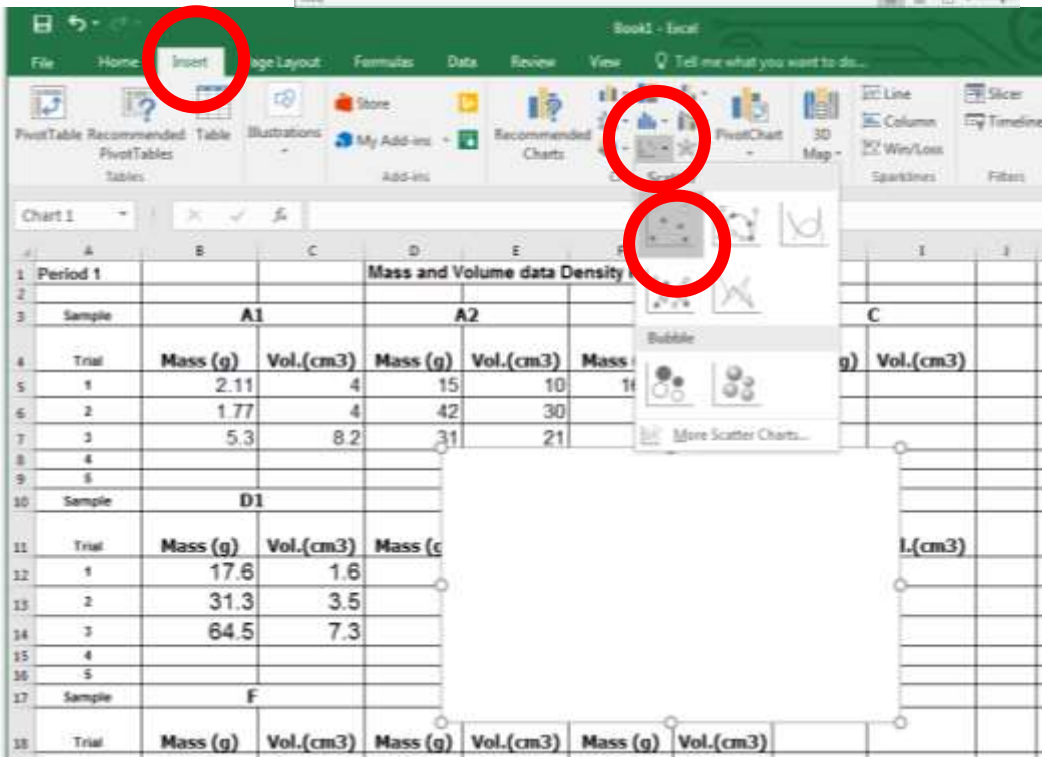
Graphing in Excel 2016

Making your Graph

1. Enter you data in the spread sheet.

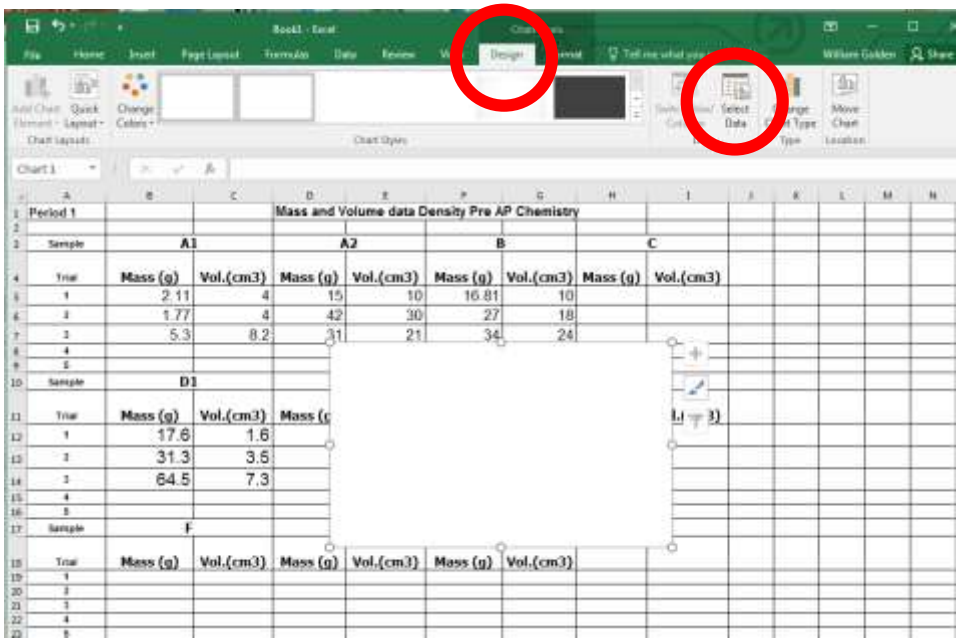


2. Go to the "Insert tab and select "Scatter"

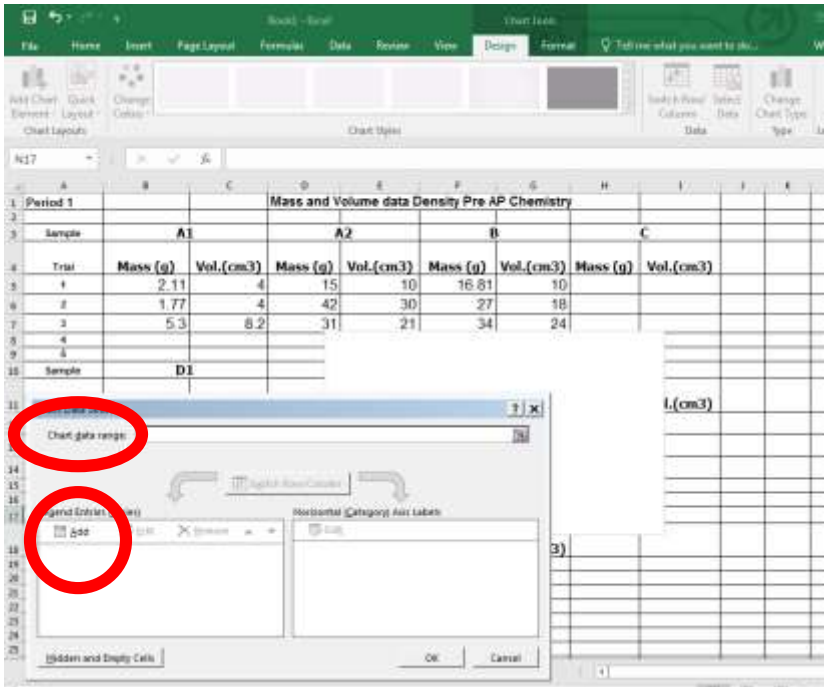


Graph Cont. 2

3. Select "Design" then "Switch Data"

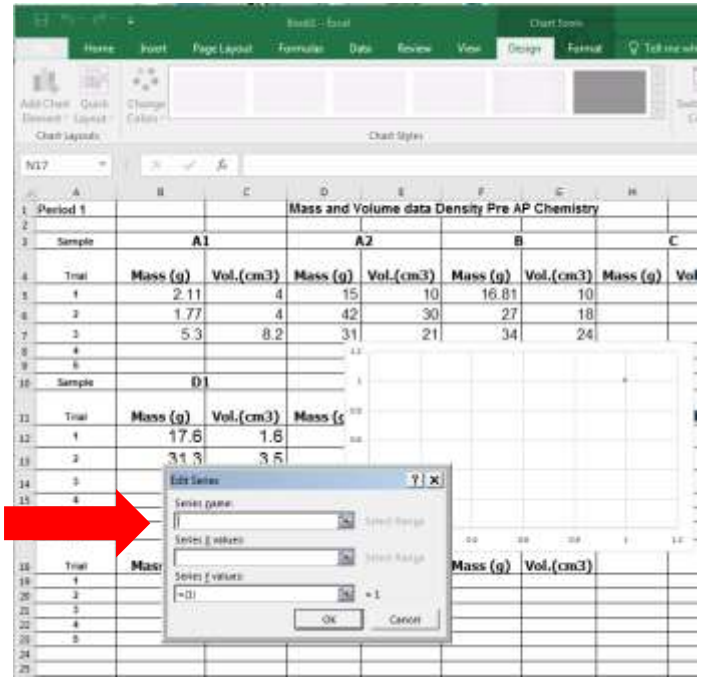


4. Clear Chart Range, and click "Add"

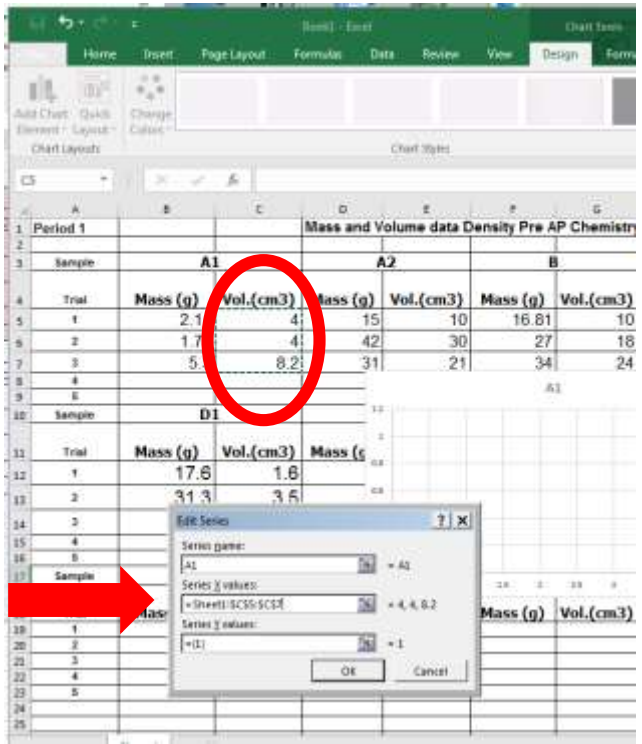


Graph Cont. 3

5. Type in Series name

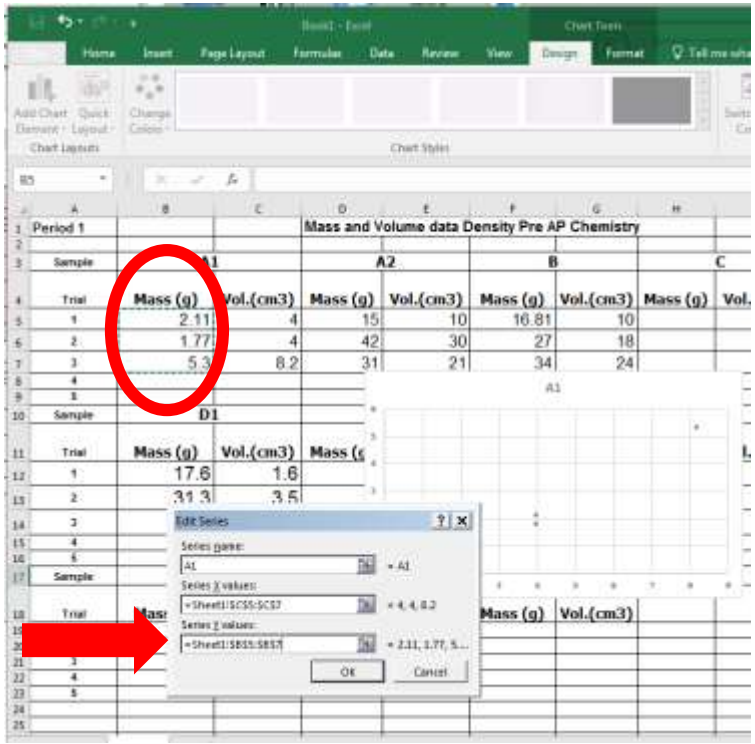


6. Click in "Series X values" and then high light the x-axis data for metal A

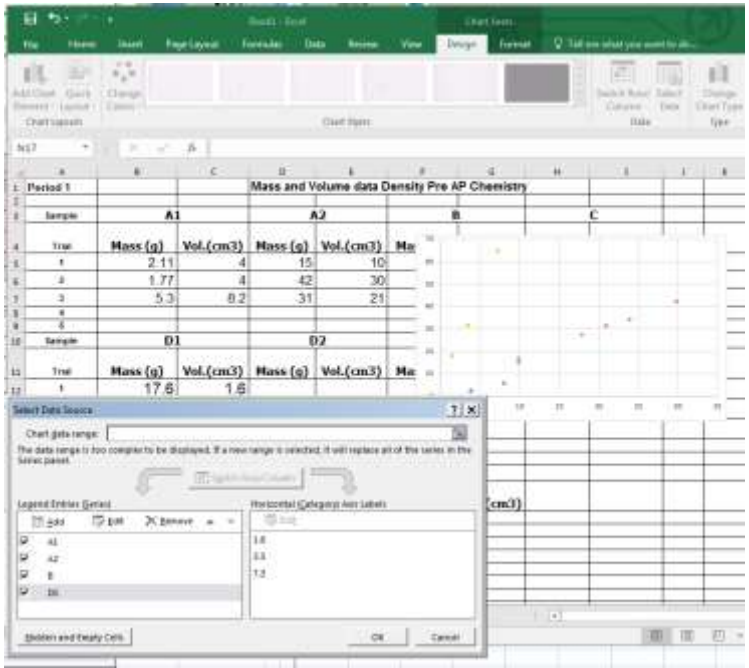


Graph Cont. 4

7. Click in "Series Y values" and, delete "={1}" then high light the y-axis data for metal A

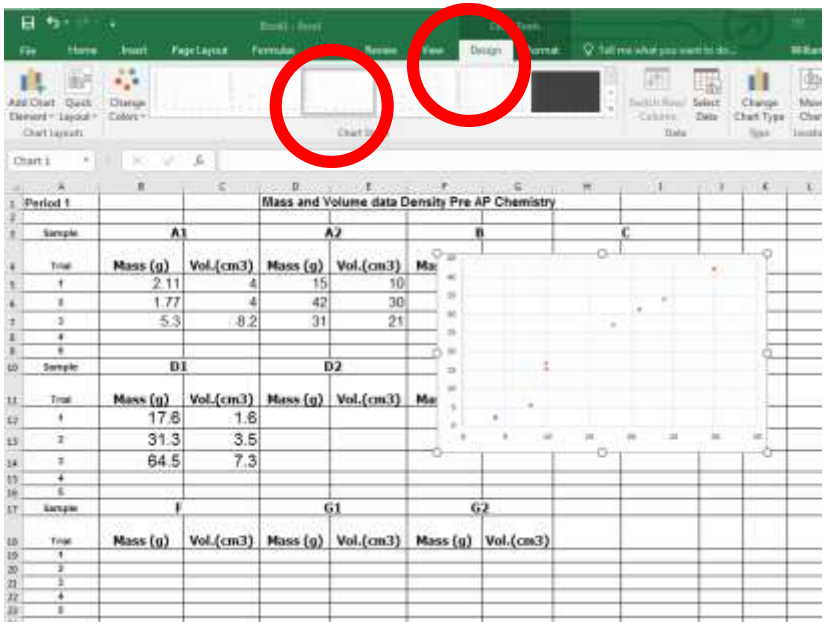


8. Repeat steps 4-7 for each metal

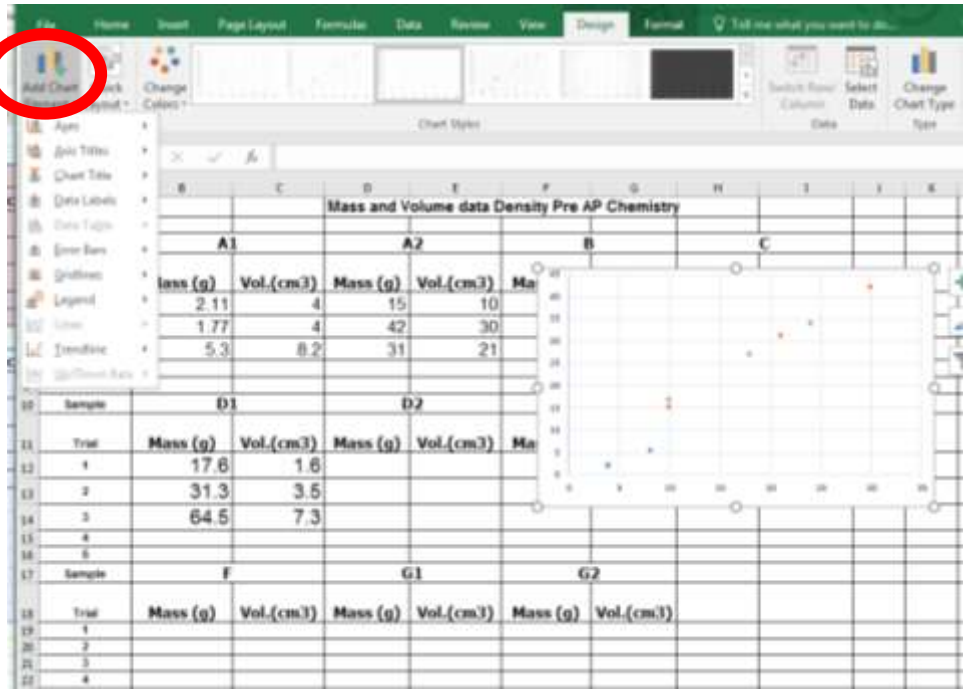


Graph Cont. 5

9. Click on chart then "design", and pick "Style 3"

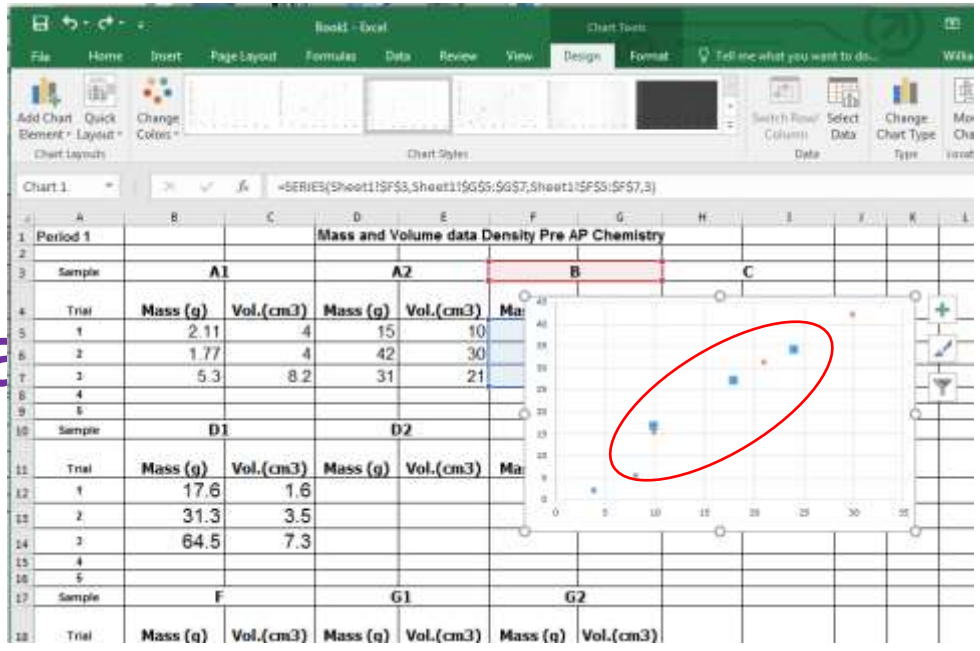


10. Fill in Axis titles and Chart title, you can calculate slope manually Or using excel "=SLOPE()" formula

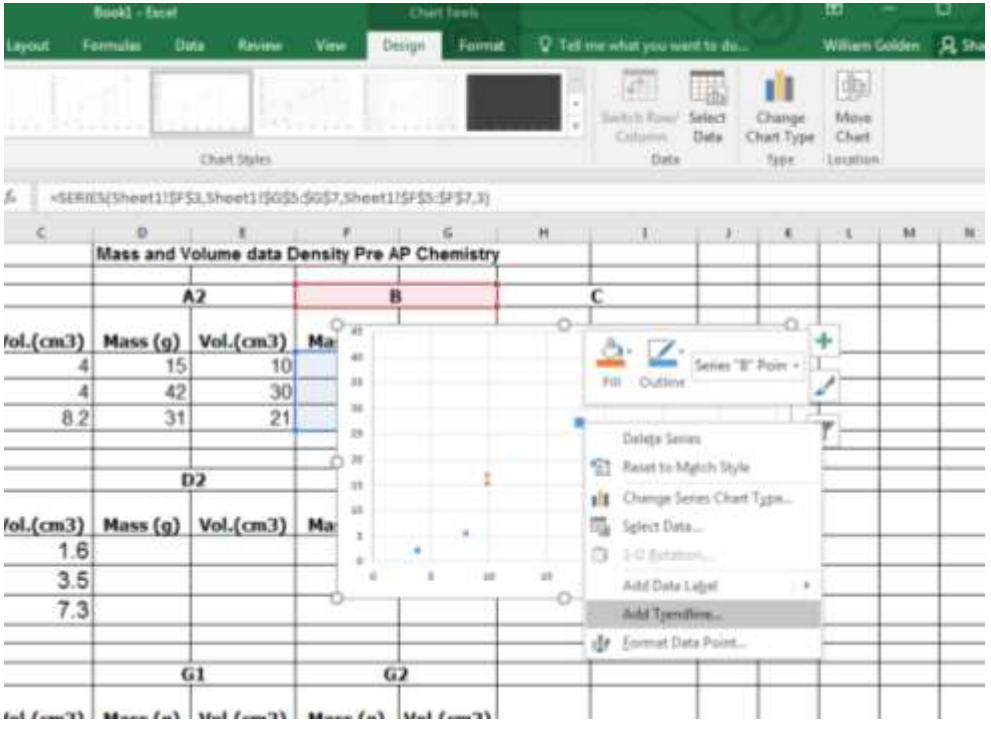


Graph Cont. 6

9. Click on chart then a
   data plot series



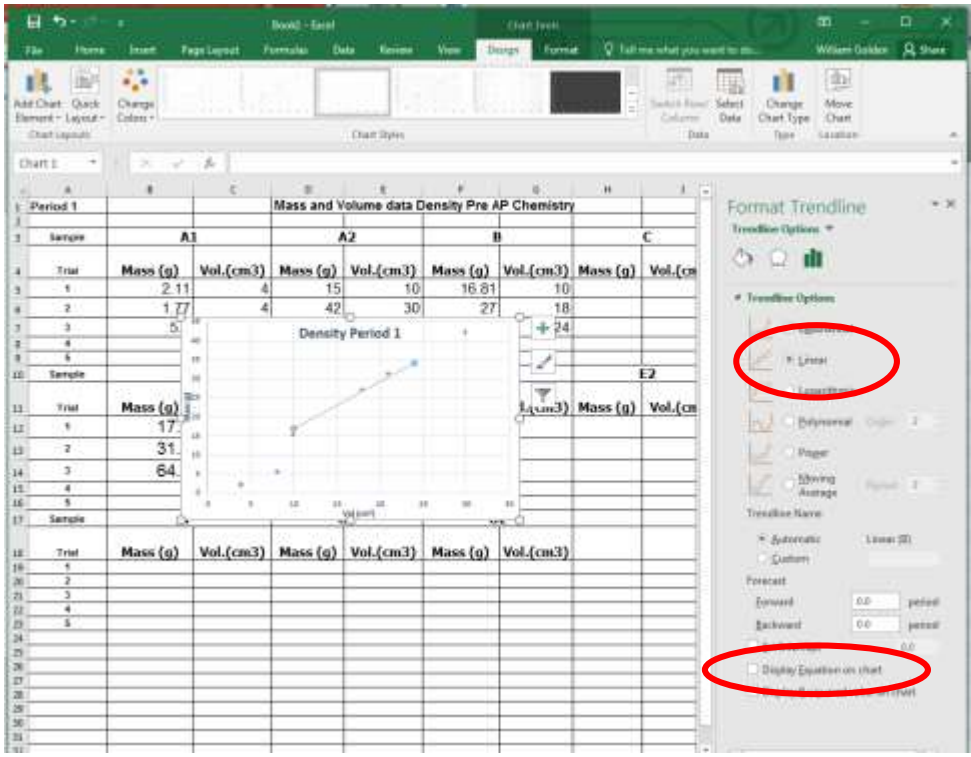
10. Right click data
    set, then select "Add
    Trendline…"



Graph Cont. 7

11. In the Format Trendline tool panel select Trendline Option, Linear since our data is linear and check "Display Equation of chart" if needed

12. Repeat for remaining plots



Graphing in Excel 2007

Making your Graph

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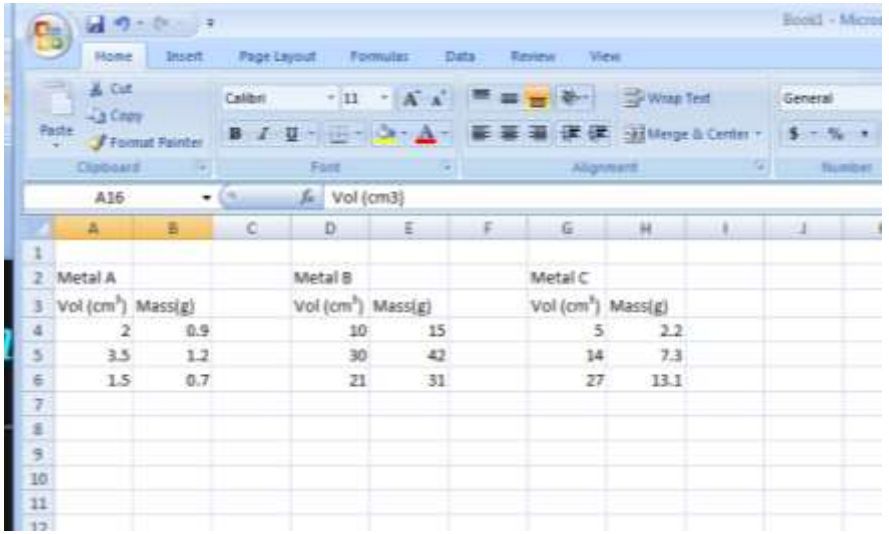
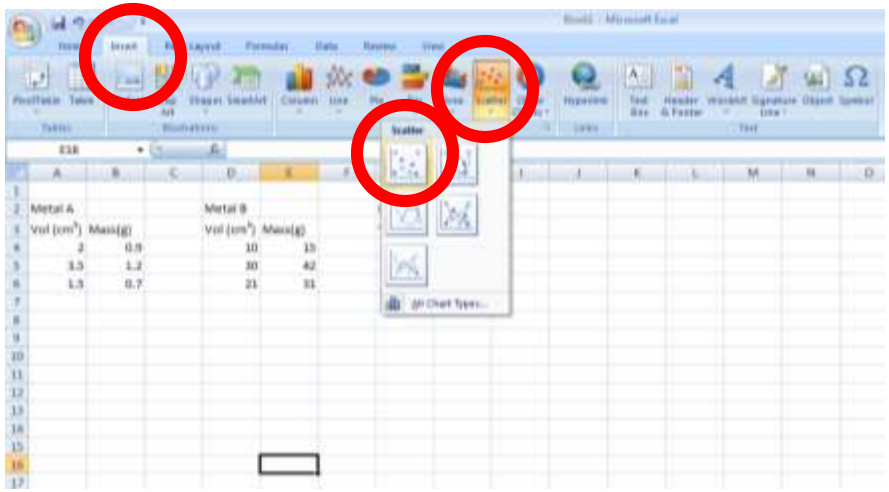
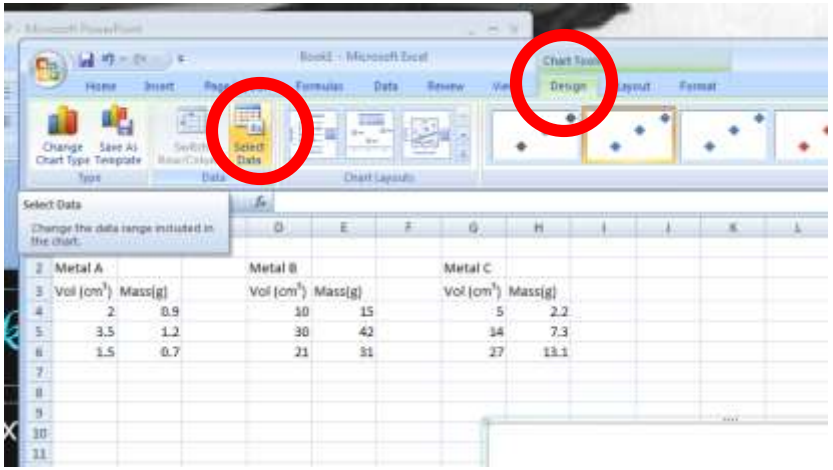


2. Go to the "Insert" tab and select "Scatter"

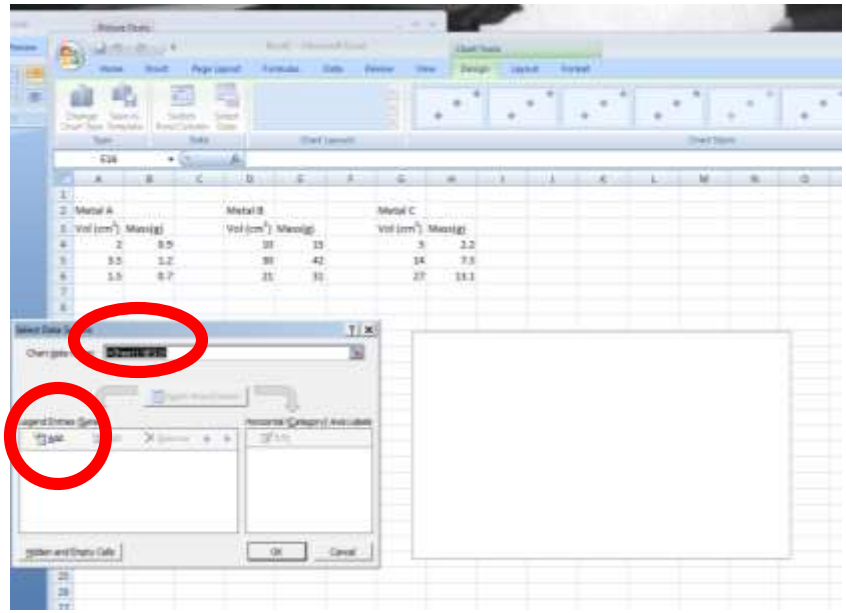


Graph Cont. 2

3. Select "Design" then "Switch Data"

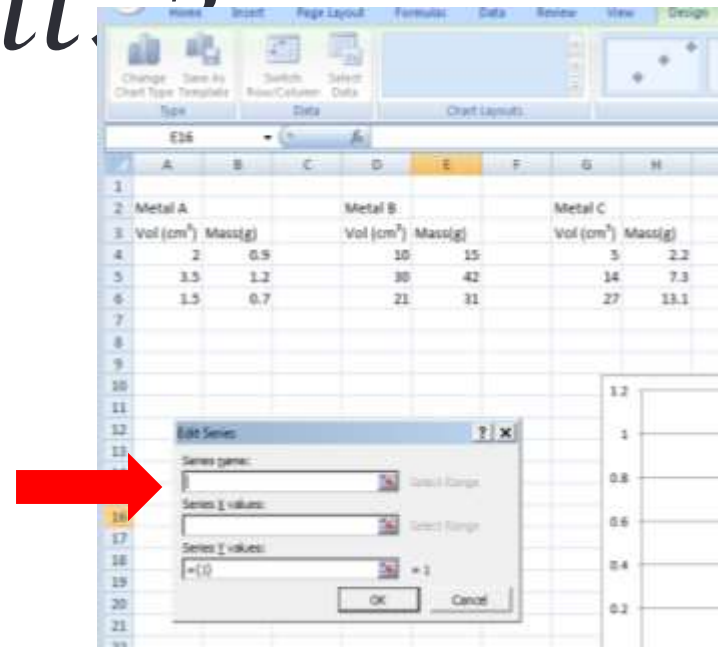


4. Clear Chart Range, and click "Add"

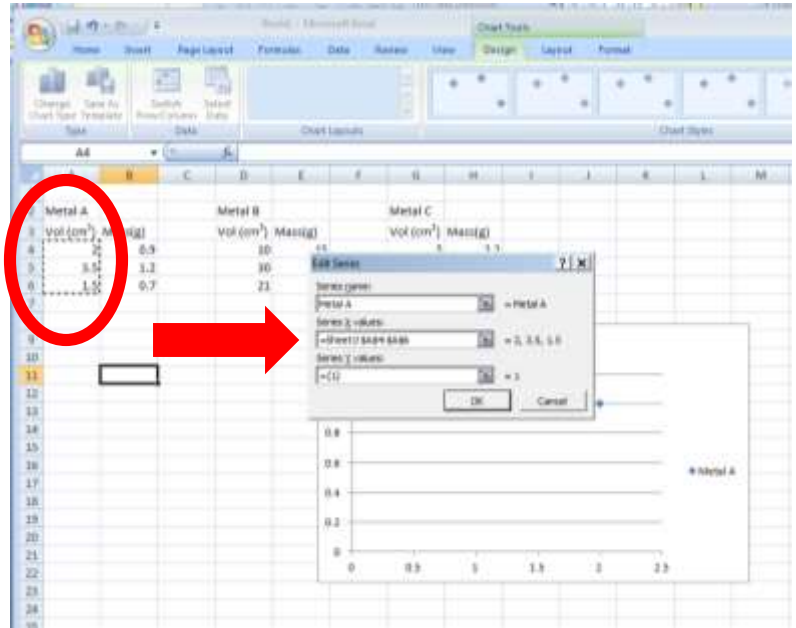


Graph Cont.2

5. Type in Series name

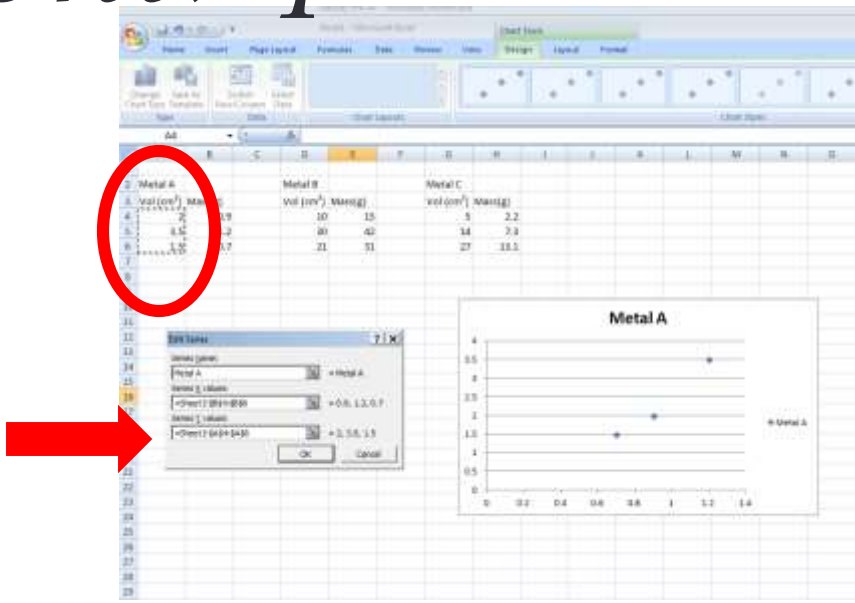


6. Click in "Series X values" and then high light the x-axis data for metal A



Graph Cont. 4

7. Click in "Series Y values" and, delete "={1}" then high light the y-axis data for metal A



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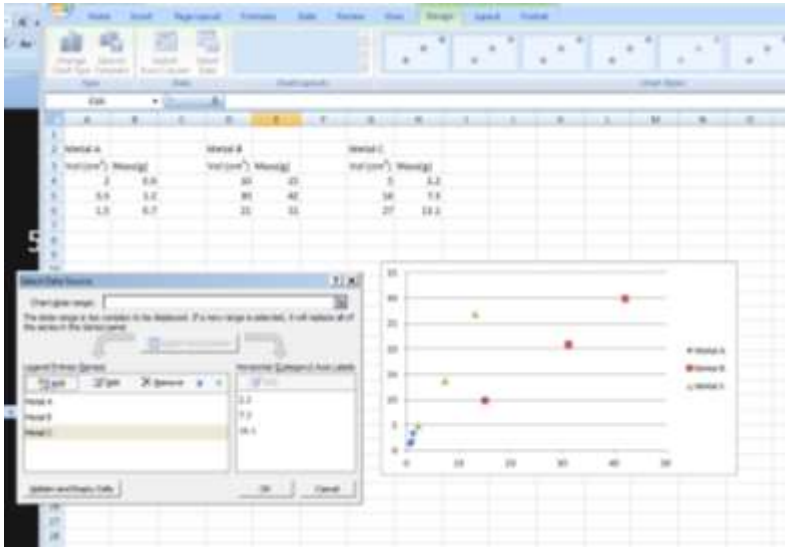
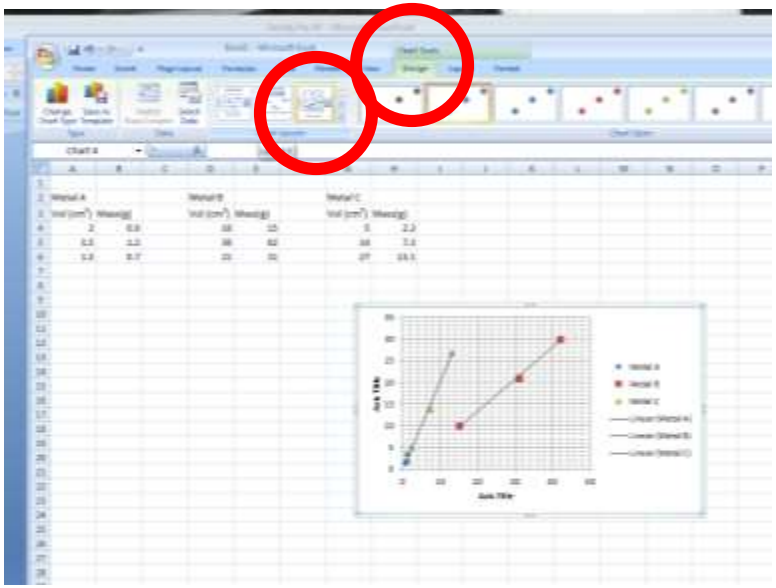


Graph Cont. 6

9. Click on chart then "design", and pick "layout 3"



10. Fill in Axis titles and Chart title, you can calculate slope manually Or using excel "=SLOPE()" formula

Email Your Graphing

Save as: PX.Lastname.Firstname.Density

Email graph to: william.golden@fwusd.org

Subject: PX.Lastname.Firstname.Density

Must be in exact form or No credit.

Each person needs to send graphs

Due by 4:00pm Monday 18-Sept-2017

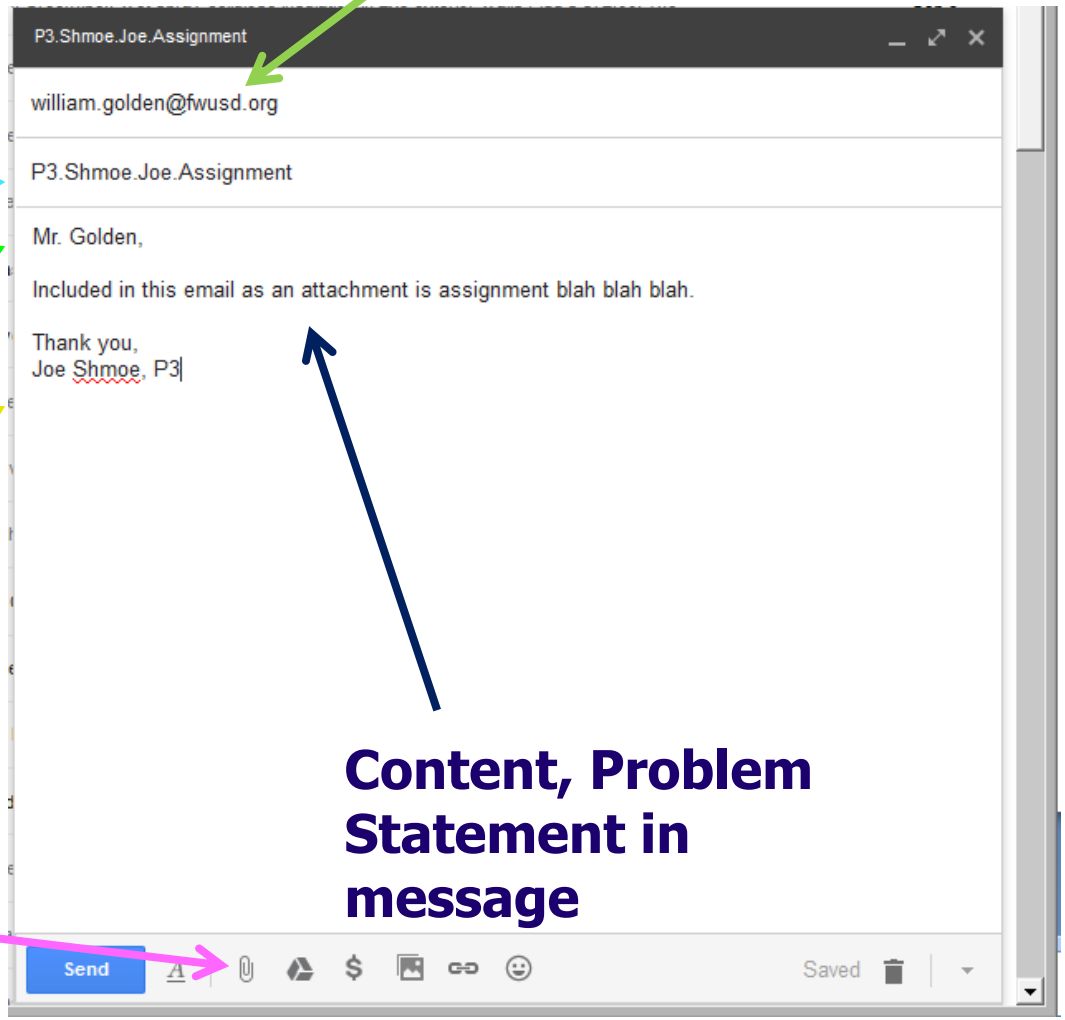
Gmail Format

william.golden@fwusd.org

Subject line: "Draft Problem Statement Bridge, Names of group members."

Salutation/ Greeting,

Complementary Closure and name



Content, Problem Statement in message

Complementary Closure and name

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Must be in exact form or No credit.

Each person needs to send graphs

Due by 4:00pm Monday 18-Sept-2017

Bell work
13-Sept-2017

If a clay brick measures 20.0cm x 10.0cm x 10cm, what is the volume of the brick, in mm^3?

scrapbookoftruth.net

EQ: Why is knowing how to fail as important if not more important than succeeding?

Objective

You will be able to

explain the concept of density correctly using the words mass, volume and weight and

manipulate mass, volume, and/ or density to find an unknown value.

Density

Density compares the mass of an object to its volume

$$D = \frac{\text{mass}}{\text{volume}} = \frac{g}{ml} = \frac{g}{cm^3}$$

Note: 1 mL=1 cm^3

Density Vocabulary

Weight is a measure of the gravitational force on an object.

Volume is the amount of space an object occupies

Mass is the amount of matter which occupies a given space.

Density as Conversion Factors

A substance has a density of 3.8 g/mL.

Density = 3.8 g/mL

Equality 3.8 g = 1 mL

Conversion factors.

$$\frac{3.8\ \text{g}}{1\ \text{mL}} \quad \text{and} \quad \frac{1\ \text{mL}}{3.8\ \text{g}}$$

Density, a Visual Explanation

100g popcorn kernels 100g popped popcorn

a. Which bag has a greater volume of popcorn?

The popped kernels have a larger volume than the unpopped kernels.

b. Which type of popcorn is more dense?

The unpopped kernels.

c. Which bag has a greater mass?

Both bags have the same mass.

d. Which bag weighs the most?

Both bags weigh the same.

Density, a Visual Explanation cont.

Using the following three words; density, mass, and volume, describe why the bag of kernels is more dense then the popped bag.

Complete sentences, correct use of words is necessary.

Lets Think

A: If an empty 125mL glass flask weighs 75g and when filled with water weighs 200g, what is the mass of the water?

B: What is the density of the water?

Applies

What is the mass (g and lb) of a bar of lead below with dimensions of base 1 50.0 mm, base 2 28.0mm with a height of 45.0mm, a width of 200.mm. The density of lead =11.35g/cm^3 and can be found in the back of your text book.

$$Vol_{trap} = \frac{h(b_1 + b_2)}{2} \times w$$

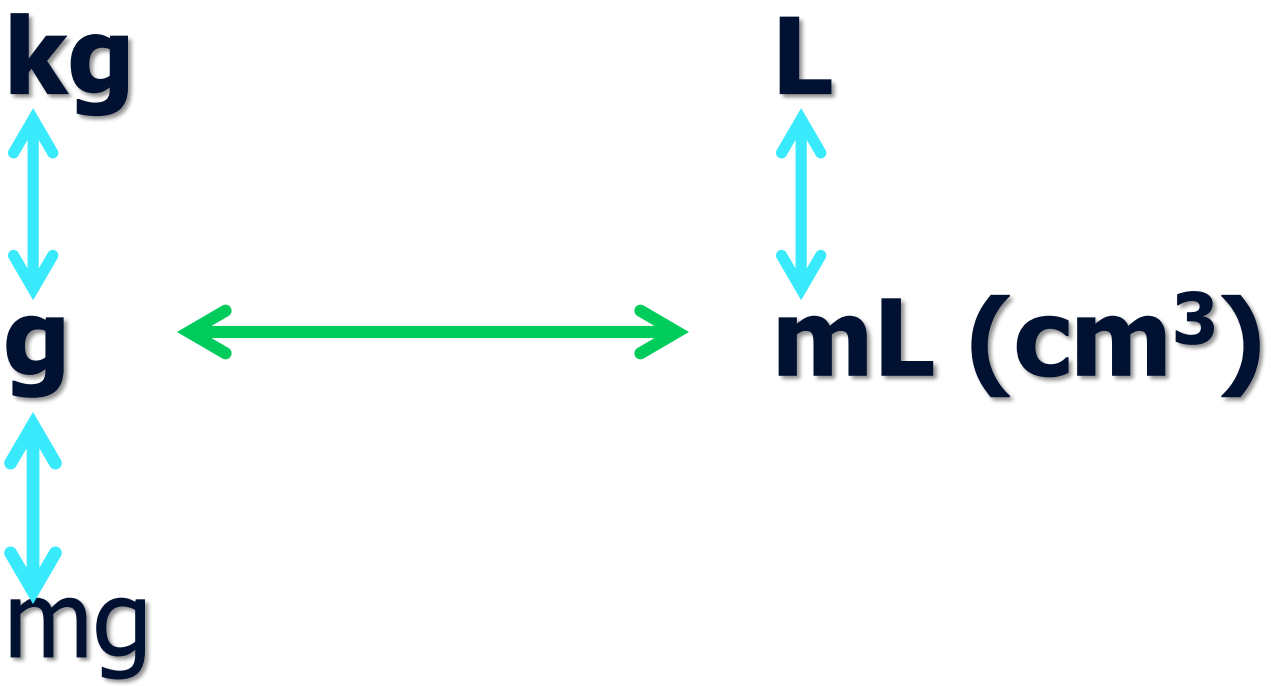
Closure

What is the percent error in the results of the following measurement: Outside air temp was found to be 29.3°C but was actually 30.04°C.

Hint: $\frac{|\text{Actual value} - \text{your value}|}{\text{Actual value}} \times 100\%$

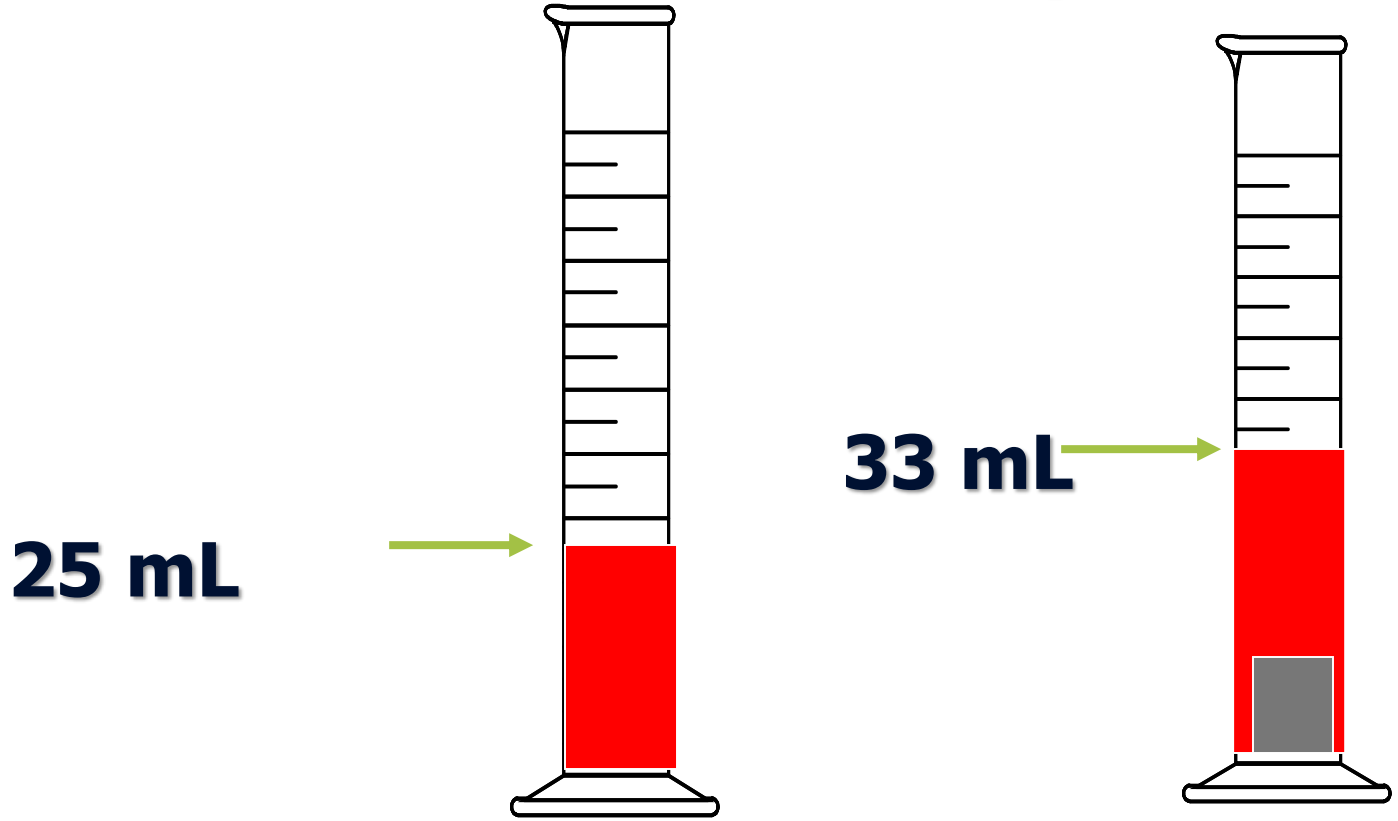
Density Connections

Mass **Volume**



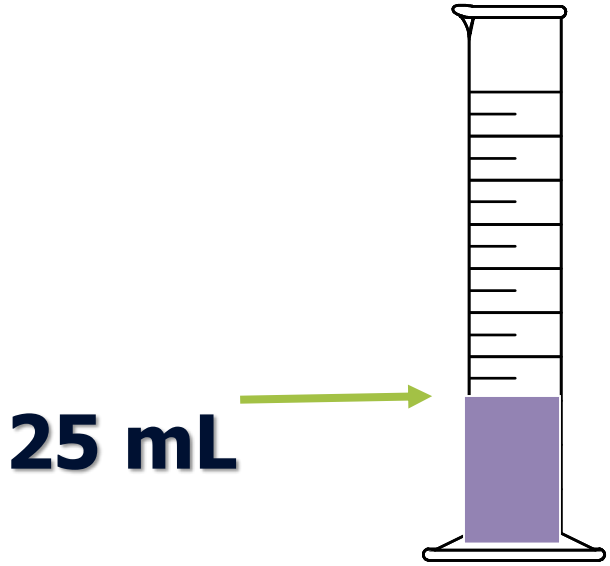
Volume Displacement

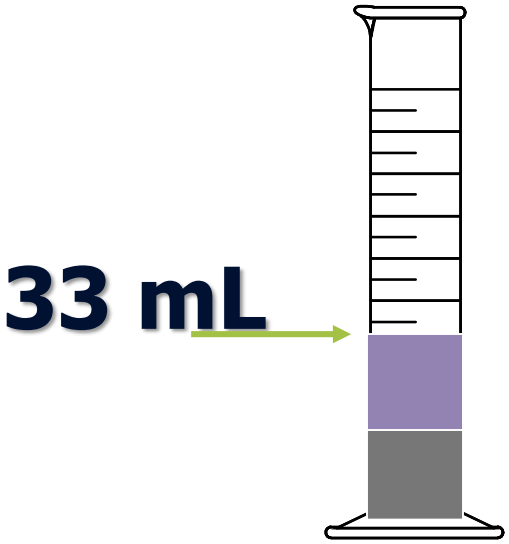
A solid displaces a matching volume of water when the solid is placed in water.



Practice

What is the density (g/cm^3) of 48 g of a metal if the metal raises the level of water in a graduated cylinder from 25 mL to 33 mL? A) 0.2 g/ cm^3 B) 6g/cm^3 C)252g/cm^3





Solution

B) 6 g/cm^3

Volume (mL) of water displaced

= 33 mL - 25 mL = 8 mL

Volume of metal (cm^3)

$$= 8 \text{ mL} \times \frac{1 \text{ cm}^3}{1 \text{ mL}} = 8 \text{ cm}^3$$

Density of metal =

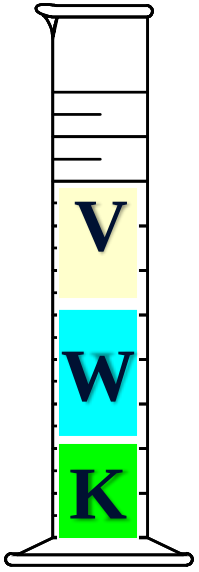
$$\frac{\text{mass}}{\text{volume}} = \frac{48 \text{ g}}{8 \text{ cm}^3} = 6 \text{ g/cm}^3$$

Practice

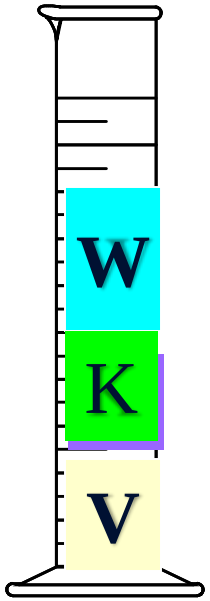
Which diagram represents the liquid layers in the cylinder?

(K) Karo syrup (1.4 g/mL), (V) vegetable oil (0.91 g/mL,) (W) water (1.0 g/mL)

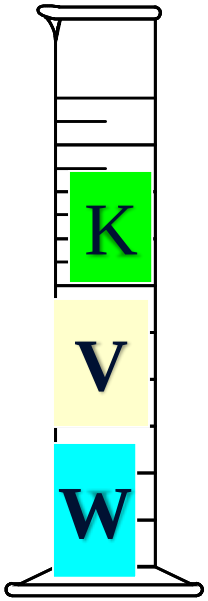
1)



2)

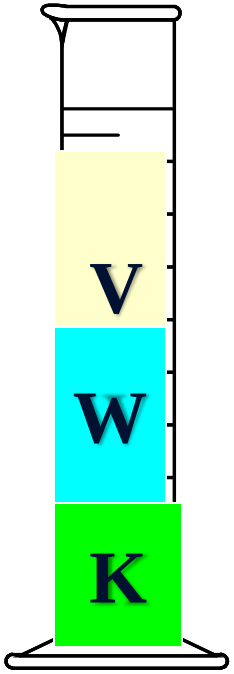


3)



Solution

1)



(V) vegetable oil (0.91 g/mL,)

(W) water (1.0 g/mL)

(K) Karo syrup (1.4 g/mL),

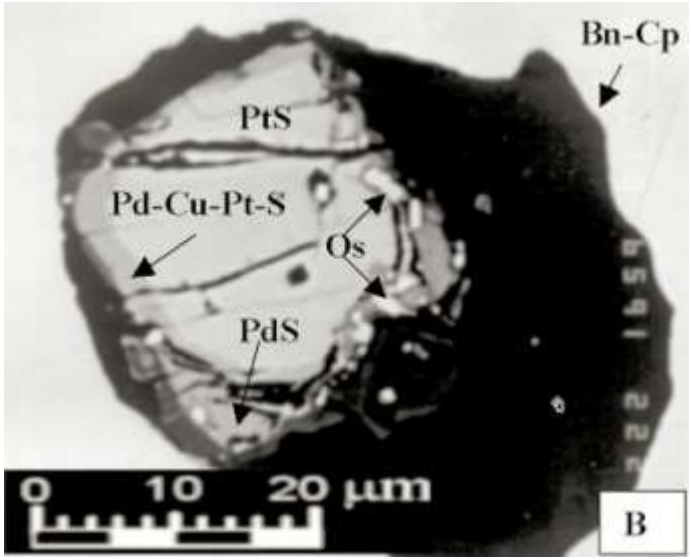
Practice

Osmium is a very dense metal. What is its density in g/cm^3 if 50.00 g of the metal occupies a volume of 2.22cm^3?

1) 2.25 g/cm^3

2) 22.5 g/cm^3

3) 111 g/cm^3



Solution

2) Placing the mass and volume of the osmium metal into the density setup, we obtain

$$D = \frac{\text{mass}}{\text{volume}} \rightarrow \frac{50.00\ g}{2.22\ cm^3} \rightarrow$$

$$\rightarrow 22.522522\ g/cm^3 \rightarrow 22.5\ g/cm^3$$

Step by Step

After crossing a bridge in your car you come up to a massive concrete block obstructing your view, if the block has a volume of $15m^3$ and a mass of 4,500 kg. What is its density in g/L?

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$$\frac{4\,500\ \text{kg}}{15\ \text{m}^3} \times \frac{1\ \text{m}^3}{1\,000\ \text{dm}^3} \times \frac{1\ \text{dm}^3}{1\ \text{L}} \times \frac{1\,000\ \text{g}}{1\ \text{kg}}$$

300g/L

Learning Check

A group of students collected 125 empty aluminum cans to take to the recycling center. If 21 cans make 454 grams of aluminum, how many liters of aluminum (D=2.70 g/cm^3) are obtained from the cans?

A)1.0 L B) 2.0 L C) 4.0 L

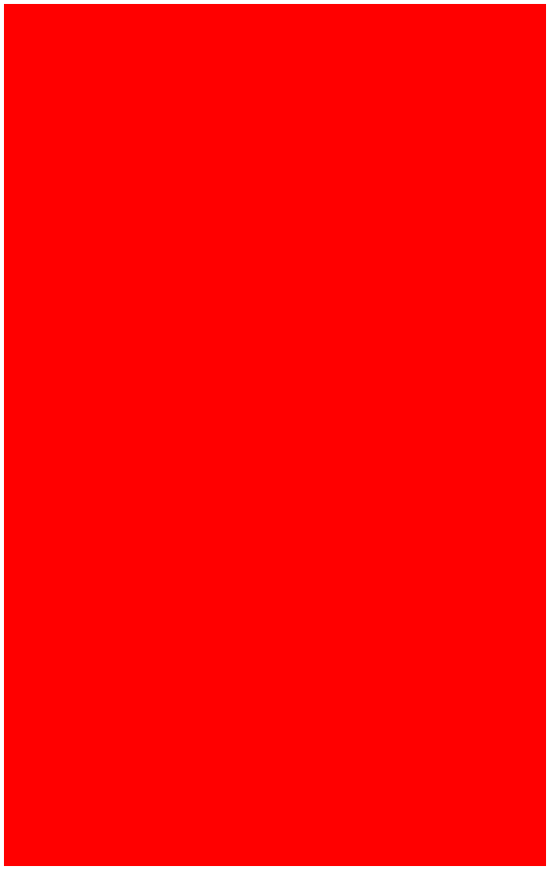
Solution

A) 1.0 L

$$125 \text{ cans} \times \frac{454 \text{ g}}{21 \text{ cans}} \times \frac{1 \text{ cm}^3}{2.70 \text{ g}} \times \frac{1 \text{ mL}}{1 \text{ cm}^3} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 1.0 \text{ L}$$

Why Does it not Float?

Please list 3 or more reasons why Diet Coke floats and Coke sinks



"Density Practice Problems"

Complete ALL Work on a separate sheet of paper. The provided example should be followed. You WILL NOT RECEIVE credit if dimensional analysis is not used ☺